

Preparation of the surgical place for laparoscopic procedure of the prostate gland tumors

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Received: 2022-08-27.

Accepted: 2022-12-07



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J Clin Med Kaz 2022; 19(6):79-82

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Abstract

Aim: The purpose of this study to present the upgrading method of laparoscopic procedure of prostate cancer.

Material and methods: This work was made as part of the PhD dissertation. This technique could be recommended for treatment of the prostate gland tumors. The Patent of the Republic of Kazakhstan №35437 was received on 31.12.2021

Results: The laparoscopic procedure for both methods are the same, there is some upgrading of traditional method by proposing improvements of trocars insertion. During traditional method four working trocars are installed extraperitoneal under the control of optics. We recommend four working trocars are installed under the control of the index finger, palpating the lower epigastric vessels from the inside; it is avoid to damage of the peritoneum, injection of gas into the abdominal space, damage of the vessels of the pelvis.

Conclusion: The method allows avoiding bleeding, pneumoperitoneum, and decreased saturation; and in the early postoperative period, peritonitis is excluded and the late postoperative period, adhesive processes do not occur.

Key words: laparoscopic procedure, extraperitoneal radical prostatectomy, prostate cancer, Kazakhstan

Introduction

The pioneers of endoscopic extraperitoneal radical prostatectomy were Schuessler and colleagues who performed the first 9 cases of this procedure [1]. In the beginning endoscopic extraperitoneal radical prostatectomy caused a lot of doubts and questions due to the long duration and the scale of difficulty. Since then it has undergone many modifications. Guillonnet and Vallancien described a technique (LPR Montsouris technique) which allowed performing surgery in less than three hours [2]. New solutions were introduced for avoiding complications associated with the transperitoneal route [3,4]. Preperitoneal access was proposed by Raboy

and colleagues [5]. This way was used and justified a series of 42 cases by Bollens and co-workers in 2001[6].

Comparison between laparoscopic procedures and open procedures give more advantages for laparoscopic procedures due to shorter postoperative hospital stay, faster return to physical activity and through advanced optical systems, better vision of the operative field [7]. For patients with localized prostate cancer laparoscopic radical prostatectomy is the best way for treatment [8]. LPR has become a first line treatment for patients with localized prostate cancer, in many centers around the world. Diagnostic surgeries and reconstructive operations can be made by urological laparoscopy. Laparoscopic technic has many benefits such as lower consistency

risk and faster recovery time after surgery. But this operation is fraught with some complications during entry to abdomen including visceral injury, urological tract injury, hemorrhage, herniation and infection [9]. Basically, complications occur when the laparoscope is entry to abdominal wall. These complications could follow to mortality. However, a very important advantage of laparoscopy is saving time. Reducing of entry time for performing of laparoscopy could decreased overall surgery time and complication it is also reduce of anesthesia and general surgery.

For laparoscopic surgery different approaches have been created nowadays [10,11]. A few international investigations have proposed principal of safe laparoscopic entry [12-16]. Open laparoscopy named as Hasson and close, direct entry laparoscopy is used in general surgery [17]. Benefits of open entry are due to low probability of vascular injury [18]. However, this technique involves some complications. To avoid these complications, optical-controlled trocars are offered, reducing the risk of injury with intra-abdominal construction, allowing the surgeon to observe the placement of abdominal structures [18]. The Visiport optical trocar is a disposable and expendable visual entry tool which includes a cannula and hollow trocar. It is enter after injection of CO₂. This method is palmed via surgeon's hand and supported perpendicular to distend patient's CO₂ to abdomen [19]. When correct anatomical statute of trocar tip is verified by monitor, downward axial pressure is used and the trigger is activated. Downward pressure causes trocar tip situation is checked again. These series are repeated till the peritoneal cavity is reach. This is not fired till the accurate anatomical status of trocar tip is known. However, none of the laparoscopic entry techniques have obvious advantage over others. All of these methods are connected with numerous complications [20]. We propose the way of upgrading of laparoscopic entry techniques.

The aim of this article to present the upgrading method of laparoscopic procedure of prostate cancer.

Material and methods

To meet the general trend in the World Urology, interests and expectations of patients associated with laparoscopic procedures, as well as, the growing importance of laparoscopy in Kazakhstan, we also started to implement laparoscopic procedures in the East Kazakhstan region multi-profile "Center of Oncology and surgery". We made many laparoscopic procedures in patients with prostate cancer and during surgery tried improve this method. We propose the way of upgrading of procedure as a part of the PhD dissertation. Before treatment all patients provided written Informed Consent after providing detailed information about our method and traditional laparoscopic procedures, and all outcomes were explained. Only after the patient's voluntary consent, the operation was performed by using our method. The study received approval from the Semey Medical University Ethics Committee (Protocol № 2, October 18, 2019). The Patent of Republic of Kazakhstan №35437 was received in 31.12.2021.

This technique could be recommended for treatment of the prostate gland tumors. There is a known method of laparoscopic extraperitoneal radical prostatectomy, when a cavity is formed between the muscles of the anterior abdominal wall and the peritoneum before surgery. During the extraperitoneal technique, a 2 cm incision is made along the midline 1 cm below the navel. After opening the anterior leaflet of aponeurosis and retraction of the rectus abdominis muscle, a finger dissection is performed to access the space of Retzius. Then a dissector balloon is inserted in the direction of the bosom, into which up to 800 ml of gas is insufflated under visual control. After creating the working

space, the balloon-dissector is removed, an optical trocar is placed. Four working trocars are installed extraperitoneal under the control of optics. No.1, 2 along the pararectal line in the area of the iliac spines on the right is 5mm and on the left is 10mm. Then, a standard prostatectomy is performed according to a well-known technique. [1,5,21].

But this method has some disadvantages. Trocars in 40-60% damage the peritoneum and gas is pumped into the abdominal cavity which follows to unfavorable outcomes such as pressuring on the diaphragm, bladder is pushed into the surgical field, and there is high possibility to damage of the lower abdominal and iliac vessels [20].

Case presentation

Patient present in hospital 27.11.2019, male, 66 years old, non-smoker

Patient medical history. No hepatitis. No surgery procedures. No blood transfusions

The patient's and his family's medical history. Mother – n.a. Father – n.a.

Symptoms. He had complaints on difficulty urination, weakness, painful urination, and feeling of incomplete emptying of the bladder.

Case history. These symptoms have disturbed him during one year. He has been observed by urologist. It is noted that condition has deteriorated in dynamic.

Physical examination:

Weight – 98 kg

Height – 164sm

BMI – 36.4 kg/m²

Physical examination – unremarkable

X-Ray examination – unremarkable

ECG: Sinus rhythm. HR is 67 per minute. There is normal position of EAH.

Cardiologist: Arterial hypertension II degree, Risk 4. HF1

Histological analysis: Acinar adenocarcinoma of the prostate gland with perineural and vascular invasion, tumor growth is observed on the tip; there are no regional metastases in the lymph nodes. The tumor growth in the seminal vesicles is revealed

Date of surgery 29.11.2019. Laparoscopic prostatectomy with urethro-vesical anastomosis. Pelvic lymph dissection. Surgery procedure was made by our method.

Postoperative therapy.

Nacl 0.9%-500.0 + Euphyllin 10.0 No.3, Nacl 0.9%-200.0 +Tugina 500mNo.2, Furosemide 20mg No.4, Ketorol 2,0x3time a dayNo.3, Proserin 0,5x3time a dayNo.3, Ceftazidim 1.0 No.8, Fortrans 2 pack. He was in the ICU for 1 day after surgery. Postoperative period without complications, the drainage tube of the paravesical area was removed on 4 days. The catheter was removed on day 7.

Final diagnosis. C-61: Prostate cancer. T2HxMo. Arterial hypertension 2 degree. Risk 4. CHF1. Obesity second degree

Patient had satisfactory condition during checking out. There is vesicular breathing in the lungs. Heart tones are muted, rhythmic BP is 130/80 mmHg. The tongue is moist. The abdomen is regular in shape, symmetrical, participates in the act of breathing. On palpation, the abdomen is soft. There are no peritoneal signs. Liver is along the edge of the costal ribs. The spleen is not palpable. The symptom of the pounding is negative. He has not have constipation. The diuresis is independent. The Karnovsky index is 80 points.

Treatment outcome: Recovery. Patient checked out on 08.12.2019. 11 (11 days)

Table 1

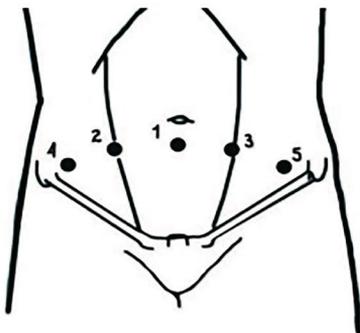
Laboratory data, and diagnostic procedures

	Normal	Unit	First	Last
BLOOD ANALYSES				
Erythrocytes	4.30-5.80	$10^{12}/\mu\text{l}$	5.79	4.64
Hemoglobin	140-180	g/l	145	126
Leucocytes	4.000-9.000	$10^9 \mu\text{l}$	7.1	6.3
ESR	2-15	mm/h	-	41
Platelets	140-400	$10^9 \mu\text{l}$	249	220
Bilirubin	3.4-21.0	mkmol/L	23.8	14.63
ASAT	10-50	U/l	-	26
ALAT	10-50	U/l	-	19
Total protein	64-83	g/L	77.5	68.2
Glucose	3.3-5.6	mmol/L	-	6.7
Urea	3.2-8.3	mmol/l	-	10.2
Creatinine	62-106	mkmol/L	109	101.3
URINE TEST				
Specific gravity	1010-1023		1010	1024
Leucocytes	0-3	in sight	1-2	Completely
Protein	-	g/L	-	1.65
Epithelium	0-3	in sight	1-2	3-4
COAGULOGRAM				
INR	0.85-1.15	Unit	1.03	-
ADDITIONAL TEST				
HIV	Negative		Negative	
Microreaction	Negative		Negative	
Hepatitis B, C	Negative		Negative	

Discussion

Our invention solves the problem of damage of the peritoneum, injection of gas into the abdominal space, damage of the vessels of the pelvis. This method helps to avoid adverse outcomes such as bleeding, pneumoperitoneum, decreasing of oxygen saturation. The method is explained on Figures 1,2,3.

Figure 1 - The location of trocars during extraperitoneal laparoscopic prostatectomy: 1, 5 – trocars of 10mm, 2, 3, 4 – trocars of 5 mm.



The patient's position is on the back with a trunk inclination of 30-45°. 2 cm of cut is made along the midline 1 cm below the navel. The anterior leaf of aponeurosis is opened and the rectus abdominis muscle is diverted after that, a finger dissection is performed to access the space of Retzius. Then a balloon dissector is carried out in the direction of the pubic, in which up to 800 ml of gas is insufflated under visual control. After creating the workspace, the balloon dissector is removed. With the index finger, the peritoneum peels off and shifts to the lateral sides of the surgical field, and 4 working trocars are installed under the control of the index finger (Figure 2), palpating the lower epigastric vessels from the inside (Figure 3). After that an optical trocar is installed. The bladder is bluntly and acutely exfoliated from the anterior abdominal wall and pubic bone. The bladder is

Figure 2 - Trocars of 2, 3, 4, 5 are installed under the control of a finger.



Figure 3 - Palpation of the lower epigastric vessels from the inside.



not enlarged. The prostate is visualized without signs of tumor germination into neighboring organs. The LigaSure apparatus gradually crosses the pubic-prostatic ligaments, between which the superficial branches of the dorsal vein of the penis (dorsal venous complex) are located, to the urethra. Capturing the tip of the prostate gland, Foley catheter No.16 is passed through it, inflate the cuff in the bladder. It is raised up, gradually peeling off the posterior surface of the prostate gland from the rectum. The lateral neurovascular bundle of the prostate gland is crossed by the LigaSure apparatus on both sides. When the posterior surface of the prostate gland and seminal vesicles are mobilized, the vessels feeding the seminal vesicles of the lateral walls of the prostate gland are ligated. The vas deferens intersects. Then the neck of the bladder is crossed, removing the prostate gland

and seminal vesicles in a single block, partially preserving the neck of the bladder, under the control of the estuaries of the ureters. Foley's catheter is passed through the urethra into the bladder, the cuff is inflated. The bladder is pulled up to the urethra; a single-row suture is applied to the urethrovesical anastomosis. Iliac lymphodissection is performed on both sides, as well as lymphodissection of the obturator fossa on both sides. Hemostasis is monitored. Hemostasis is dry; a retroperitoneal drainage tube is left in the pelvis, removed to the skin. Trocars are removed under the control of an endovideoscope. Layered suturing of the wound was carried out. An aseptic bandage was applied to the wound.

Conclusion

The main difference between the traditional laparoscopic procedure and our method is trocars insertion. During traditional laparoscopic procedure four working trocars are installed

extraperitoneal under the control of optics. Our method recommends four working trocars are installed under the control of the index finger, palpating the lower epigastric vessels from the inside which allows avoiding bleeding, pneumoperitoneum, and decreased saturation; and in the early postoperative period, peritonitis is excluded and the late postoperative period, adhesive processes do not occur.

Disclosures: There is no conflict of interest for all authors.

Acknowledgements: The authors thank all staff of East Kazakhstan region multi-profile "Center of Oncology and surgery", Oskemen, Kazakhstan.

Funding: None.

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